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Meghalaya Livelihood Improvement through Forest Enhancement

Meghalaya Basin Development Authority

Japan International Cooperation Agency

No. MBDA/JICA/2023/12/1273 **Dated: Shillong, the 4th Oct, 2023**

From
The Additional Project Director
MegLIFE, MBDA, Shillong

To
The Block Project Managers
MegLIFE, MBDA

Subject: Targets and Guidelines for Construction of Soil & Water Conservation Structures in MegLIFE Villages for the FY 2023-24

SPMU, MegLIFE divided the entire project targets for construction of Soil and Water Conservation (SWC) structures into 3 years of implementation. For the FY 2023-24 (1st year of SWC implementation) 1561 SWC structures will be constructed/identified for construction. Along with this, 2845 ha of plantation areas will also be treated with either Half-moon (Eye Brow) Terracing or Staggered Contour Trenches.

2. Block wise targets for construction of SWC structures and treatment of plantation area is attached at **Annexure-1**.

3.Guidelines relating to process of implementation and model design and estimate etc. are enclosed herewith at **Annexure-2** for your reference and necessary action.

Enclo: As Stated

(Gunanka DB, IFS)
Additional Project Director
MegLIFE, MBDA, Shillong

Copy to:

1. The Project Director, MegLIFE, MBDA, Main Secretariate Building, Shillong-for favour of kind information
2. The District Project Managers, MegLIFE, MBDA-for necessary action

Technical Specialist, Project Management
MegLIFE, MBDA, Shillong

Annexure-1

Yearwise Breakup of Targets (2023-24)

Item No.	District	Units	West Garo Hills				South West Garo Hills		South Garo Hills			East Garo Hills			North Garo Hills		East Khasi Hills		East West Khasi Hills	South West Khasi Hills	Ri-Bhoi		West Jaintia Hills	East Jaintia Hills	Total
	Blocks		Dalu	Gambegre	Rongram	Tikri killa	Betasing	Zikzak	Gasuapara	Baghmara	Rongra	Dambo-Rongjeng	Samanda	Songsak	Kharkutta	Resubelpara	Mawkynrew	Mawryngkneng	Mairang	Mawkyrwat	Umling	Umsning	Thadlaskein	Saipung	
	Villages	Nos.	22	19	24	21	23	22	22	19	18	20	20	22	19	22	21	13	23	21	21	20	20	18	450
	Batch 1 Villages	Nos.	11	7	9	8	12	12	8	10	6	9	8	4	2	7	6	6	15	5	9	5	7	9	175
	Batch 2 Villages	Nos.	7	9	7	6	7	7	13	9	7	10	6	10	16	8	10	4	4	8	7	8	6	9	178
	Batch 3 Villages	Nos.	4	3	8	7	4	3	1	0	5	1	6	8	1	7	5	3	4	8	5	7	7	0	97
1.6.4	Construction of Check Dam	Nos.	18	13	15	13	19	19	16	17	11	16	13	10	10	13	12	10	22	10	15	10	12	16	312
1.6.5	Construction of Minor Irrigation Check Dam	Nos.	9	7	8	7	10	10	8	9	6	8	7	5	5	6	6	5	11	5	8	5	6	8	159
1.6.6	Construction of Conservation Ponds (can also be used for fishery)	Nos.	9	7	8	7	10	10	8	9	6	8	7	5	5	6	6	5	11	5	8	5	6	8	159
1.6.7	Construction of Conservation Pond/Dug out Pond	Nos.	13	10	11	10	14	14	12	13	8	12	10	7	7	10	9	7	16	8	11	8	9	12	231
1.6.8	Construction of RCC Water Storage Tank for Drinking Water	Nos.	13	10	11	10	14	14	12	13	8	12	10	7	7	10	9	7	16	8	11	8	9	12	231
1.6.9	Construction of Spring Tapped Chamber	Nos.	9	7	8	7	10	10	8	9	6	8	7	5	5	6	6	5	11	5	8	5	6	8	159
2.5.1	Construction of Rainwater Harvesting Structure	Nos.																							
2.5.2	Construction of Drinking Water Tank	Nos.	18	13	15	13	19	19	16	17	11	16	13	10	10	13	12	10	22	10	15	10	12	16	310

Target for Treatment of Plantation Area with Half-moon Terracing/ Staggered Contour Trenches

Block	2023 Plantation Area
Baghmara	191.7
Betasing	147.24
Dalu	118.49
Dambo Rongjeng	168.24
Gambegre	71.99
Gasuapara	70.62
Kharkutta	71.75
Mairang	153.52
Mawkynrew	220.04
Mawkyrwat	88.05
Mawryngkneng	101.38
Resubelpara	216.35
Rongara	108.49
Rongram	78.88
Saipung	232.78
Samanda	105.44
Songsak	42.75
Thadlaskein	203.91
Tikrikilla	65.56
Umling	153.21
Umsning	117.44
Zikzak	117.36
Total	**2845.19**

NB- Agroforestry Areas shall not be taken up under these activities as these areas will be treated with SALT approach under SWC component.

Annexure-2

Guidelines for Implementation

Soil & Water Conservation is one of the important activity under the Sustainable Forest Management component of MegLIFE Project. Basic principle reckons that the lands(arable & non−arable) should be treated and put to sustainable use as per their capability.

While numbers of SMC works are to be undertaken in the project areas, the processes and procedures followed by the implementing teams in planning, designing, preparing cost estimates and execution of various measures are matters of concern. With a view to bringing uniformity in the implementation process these guidelines for SWC works under MegLIFE are circulated.

1. Approval and issuance of sanctions

a) The estimates of SWC activities will be prepared by the Field Engineers in consultation with VPIC EC members. These estimates would be submitted to the Civil Engineer, SPMU after due checking by the BPM.

b) The approval of the works will be accorded by the SPMU, MegLIFE and accordingly funds will be allocated villages wise from SPMU, MegLIFE. Sanctions and work orders will be given by the DPMU concerned as per the village wise funds received.

2. Preparation of Site-Specific Estimates

Key Steps to be followed

a) Organize a meeting with VPIC EC to consult the micro plan (for batch-1 village only) and finalize sites accordingly. For Batch 2 and Batch-3 Villages, VPIC members shall be briefed about the activity and accordingly, the number of interventions under SWC shall be identified.

b) A detailed site survey needs to be conducted following the standard checklist as provided by SPMU

c) Site-specific design & estimate of different SWC Structures to be made by the FEs following model design & estimate provided by SPMU. (**Attached at Annexure-3**)

d) Estimates shall be prepared within the cost norm as mentioned in the model estimate.

e) Site-specific Design and Estimate as prepared by the FEs shall be counter-signed by the VPIC Chairperson/Secretary and BPM and submitted to SPMU for approval.

f) After getting a sanction order for construction, Procurement of materials shall be done following community procurement guidelines as circulated by SPMU vide

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g) At least one dugout pond for fishery shall be constructed in all villages.

3. Basic Records to be maintained at VPIC

a) All records relating to procurement **(reference Community Procurement Checklist)**

b) Material Supply Register:

Details of construction materials received and utilized for construction must be properly maintained by the VPIC.

c) Measurement Book:

Measurement Book needs to be maintained by the FE properly with correct entries on volume and type of work done. It has to be sample checked & measured by the Civil Engineer, SPMU after completion of works.

d) Muster Roll:

Day-wise engagement of labour (person-wise) against activity name shall be entered in the muster roll before making payments against wages to the VPIC members.

e) Bills/ Vouchers/Utilization Certificate

f) Fixed Asset Register

SWC structure constructed shall be entered in the fixed asset register along with GPS coordinates of the location of the structure.

Treating plantation areas with Half-moon Terracing/ Staggered Contour Trenches
Staggered Contour Trenches-
Objective-

The contour trench works are the method of constructing the trenches along the contour lines of the slope with 10 - 30%. Objectives of the trench works are to retain water and sediment on the slope, to increase the water infiltration, to improve local soil moisture, and as a result, to reduce the runoff discharge and sediment to the downstream watershed. There are three (3) types of contour trenches, that is, continuous trenches, and interrupted (line and staggered) trenches. The continuous contour trenches are essentially used for moisture conservation in low rainfall areas. The staggered trenches will be implemented in MegLIFE, considering the high rainfall condition of Meghalaya.

Implementation of Staggered Contour Trench Works

- The staggered contour trench works will be implemented by VPICs in the existing plantation areas of 2023 plantations.
- Model design and estimates are attached at **Annexure-4**
- Only the areas where boulders/ stones are not available naturally, plantation areas of those villages shall be selected for Staggered Contour Trench Works.

Operation and Maintenance (O&M)

The staggered contour trench works are the earthen structures. Therefore, periodical O&M works of the structures are required to keep those functional. After the construction of the works, the O&M of the structures shall be done by VPICs under the technical assistance of FE.

After the monsoon season, the overall inspection of structures should be carried out and the repair/rehabilitation work be planned by VPIC. The planned repair/rehabilitation works should be carried out by VPIC before the monsoon season and the inspection to confirm the works shall be carried out by FE.

Implementation of Half-moon terraces

Objectives/ Functions

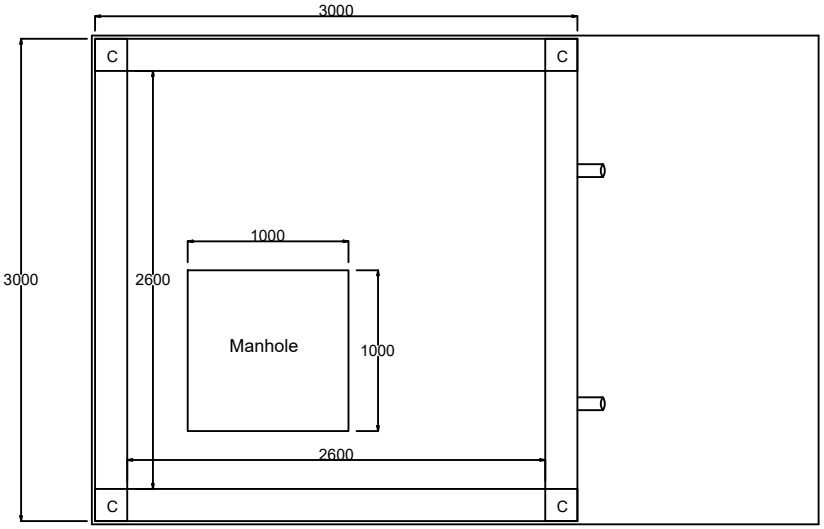
- On moderate slopes (10-20 %) and steeper slopes (>20%), half-moon are to be established for water harvesting purposes around the planted seedlings of existing plantations of 2023 in the villages.
- Model design and estimates are attached at **Annexure-4**
- The villages where boulders/ stones are available naturally, plantation areas of those villages shall be selected for half-moon terracing.

Timeline of the Works

No.	Procedure	Responsibility	Timeline
1	**Planning**		
1.1	Meeting with EC, VPIC and resolution of works	BPM & VPIC EC	1 day
1.2	**Site-specific Cost Estimation**		
1.2.1	Cost estimate	FE & EC VPIC	1 day
1.2.2	Approval of cost estimate	SPMU	7 days
1.2.3	Issuance of sanction	DPMU	2 days
2.	**Construction**		
2.1	Weeding	VPIC	1 day
3.3	Layout	FE & VPIC	1-2 days
3.4	Arrangement of materials and equipment	BPM/FE/ EC, VPIC	1-7 days
3.5	Arrangement of labor	VPIC	1 day
3.6	Construction	VPIC	7 days
3.7	Final inspection	DPM	1 day

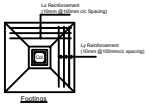
Annexure-3

RCC WATER TANK

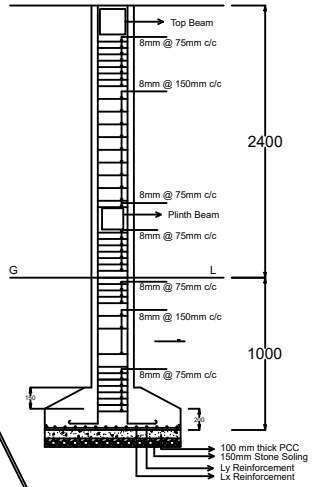


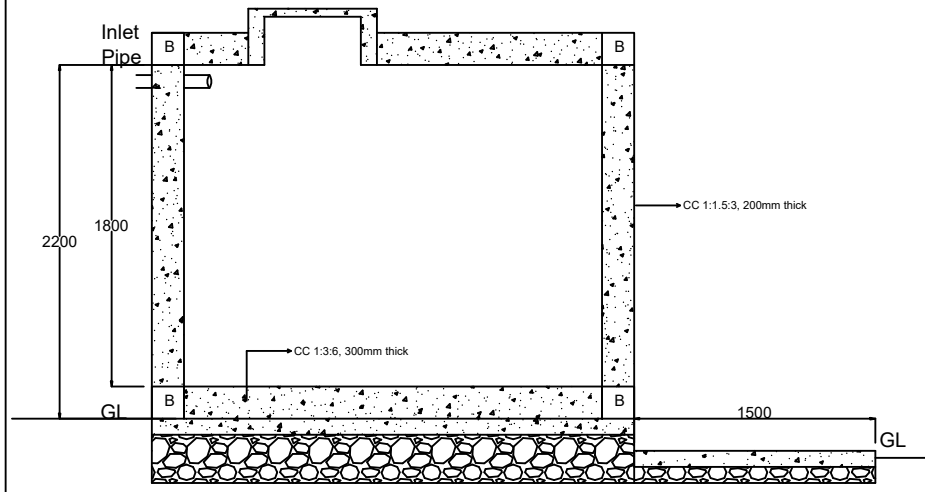
Sl. No	Beam Name	Beam Layout	Reinforcement: Near support	Reinforcement: Near midspan	Reinforcement: Stirrups detail	Reinforcement: Typical Detail
1.	PB (250 X 250)	2- 12mm Ø alth 2- 12mm Ø alth	2-12 mmØ 2-12mmØ	2-12 mmØ 2-12mmØ	8 mm @ 80 mm c/c in Ls,150 mm c/c in Ld	
2.	B-01 (250 X250)	2- 12mm Ø alth 2- 12mm Ø alth	2-12 mmØ 2-12mmØ	2-12mmØ 2-12 mmØ	8 mm @100 mm c/c in Ls,150 mm c/c in Ld	

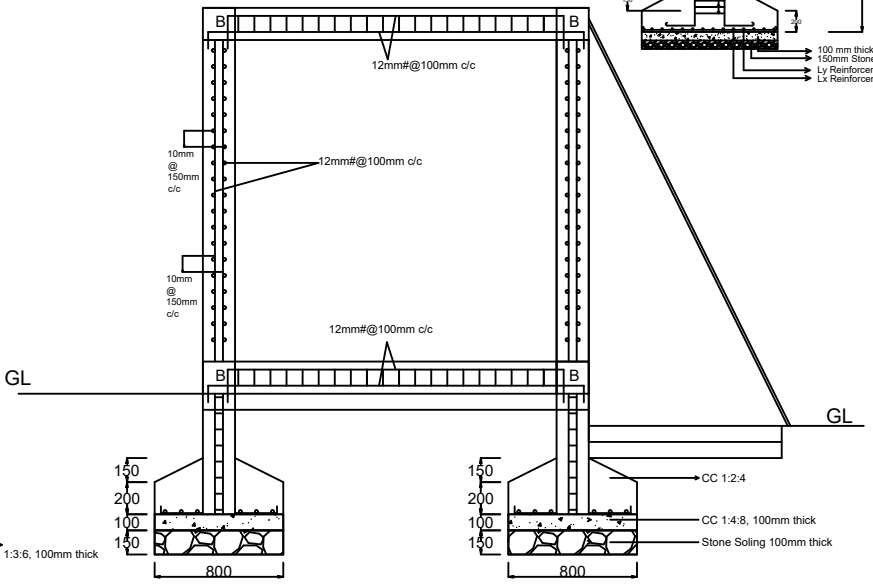
**Note: * Clear Cover for beam is 25mm.
* The stirrups spacing shall be provided as per indicated in the typical drawing.
* The span shall be indicated in the structural grid.
* Stone masonry should be provided beneath plinth beam.



Sl. No.	Columns	Column Size	Reinforcement: Foundation upto Plinth	Reinforcement: Plinth upto Top Beam
1.	C-01, C02, C-03, C-04	300 X 000	4#12Ø	4#12Ø

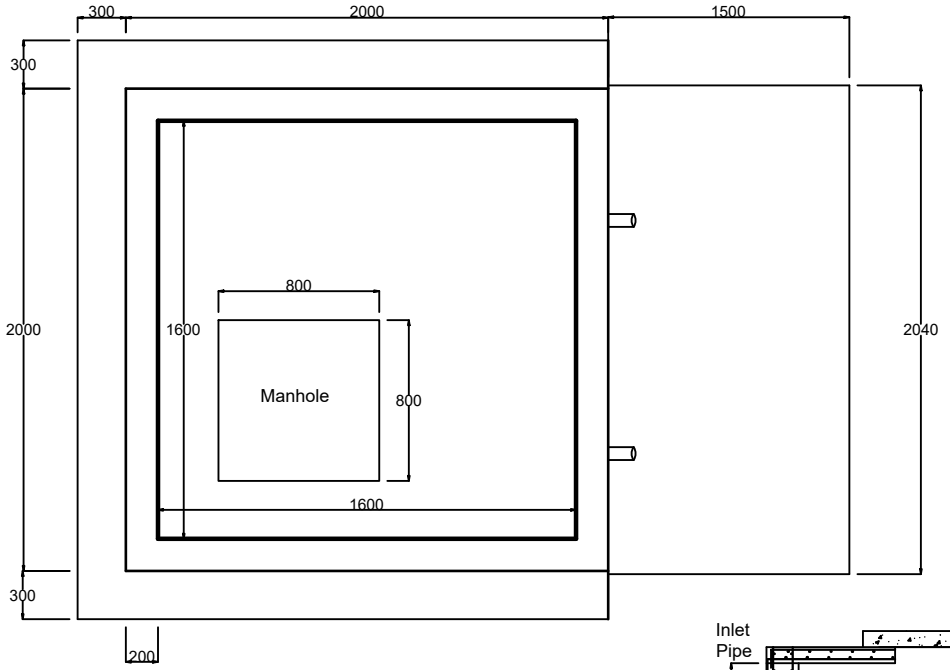


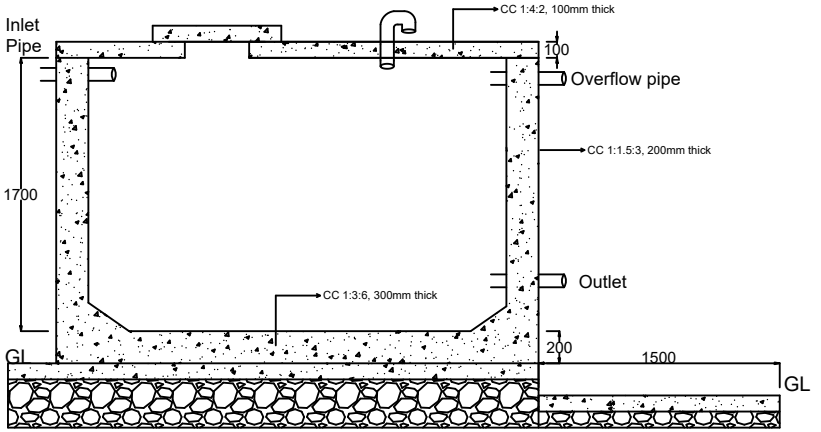


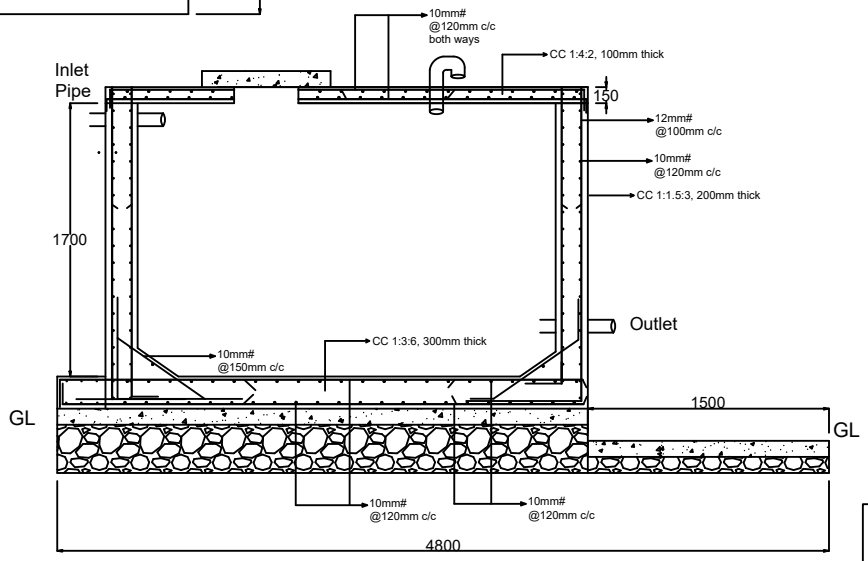


RCC WATER TANK
SIZE = (3 x 3 x 1.8)m
ALL MEASUREMENTS ARE IN MM

RCC WATER STORAGE TANK

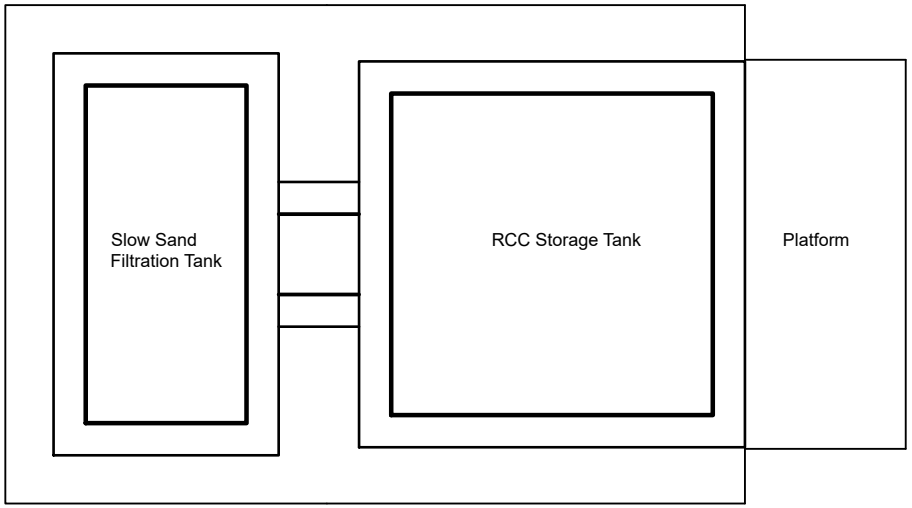


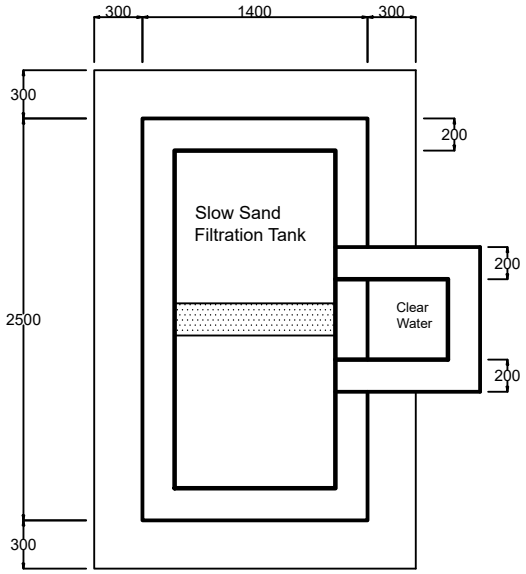


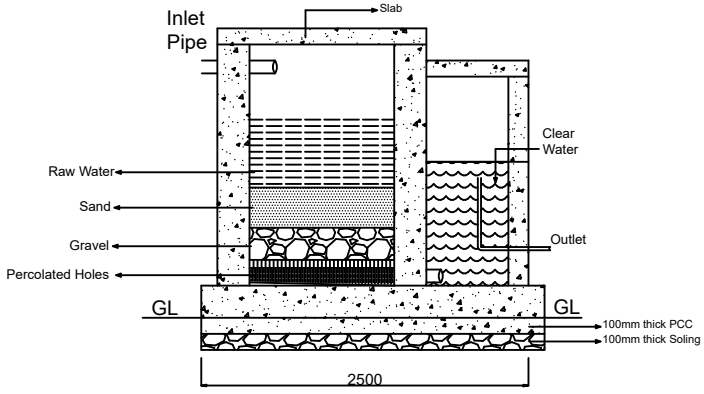


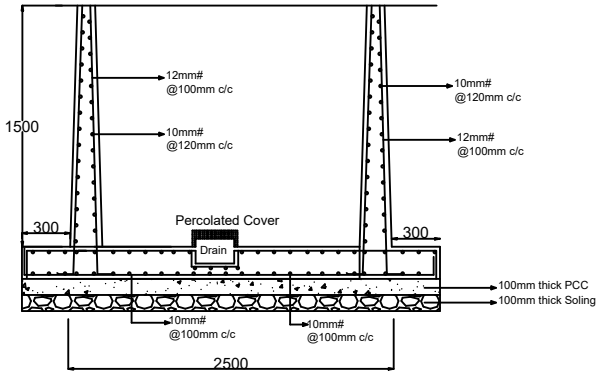
RCC WATER TANK
SIZE = (2.0 x 2.0 x 1.7)m
ALL MEASUREMENTS ARE IN MM

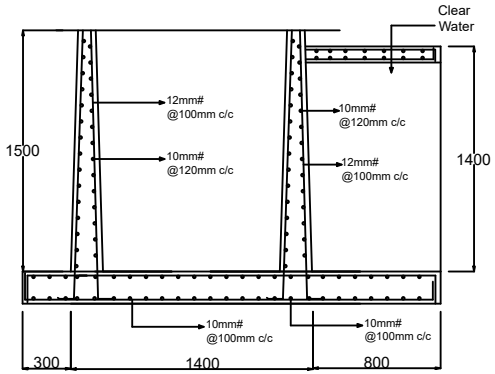
FILTRATION TANK











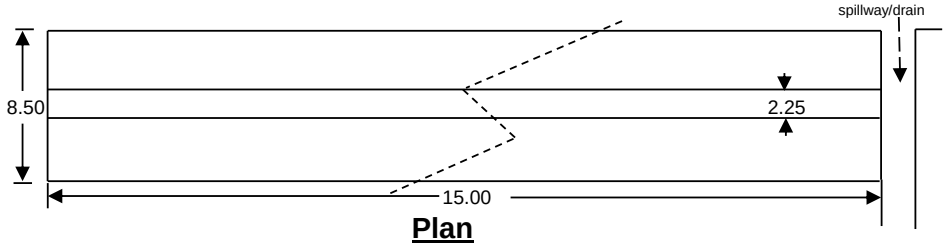
FILTRATION TANK
SIZE = (1.4x 2.5 x 1.5)m

NOTE:-

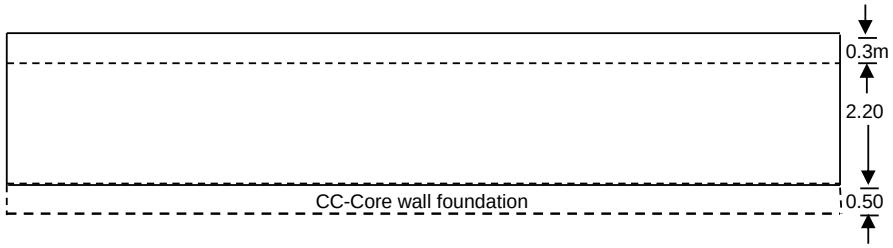
ALL MEASUREMENTS ARE IN MM

Water Harvesting Structure(Earthen Embankment with CC Core wall)

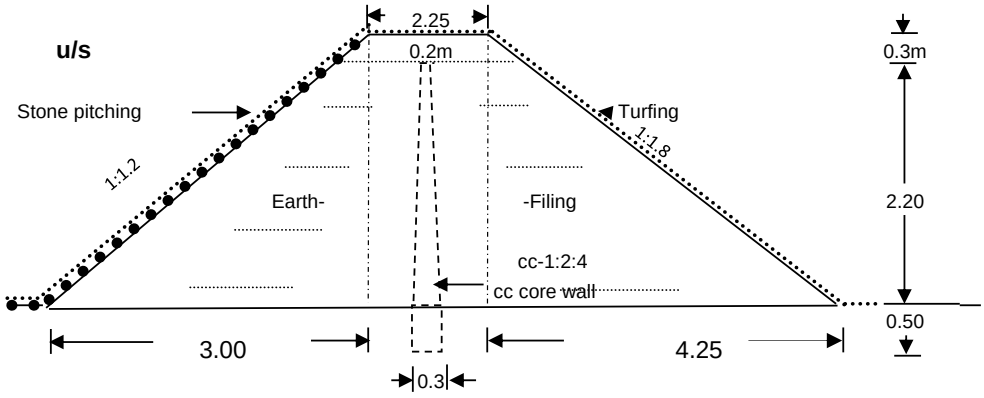
(Not to scale)



Plan



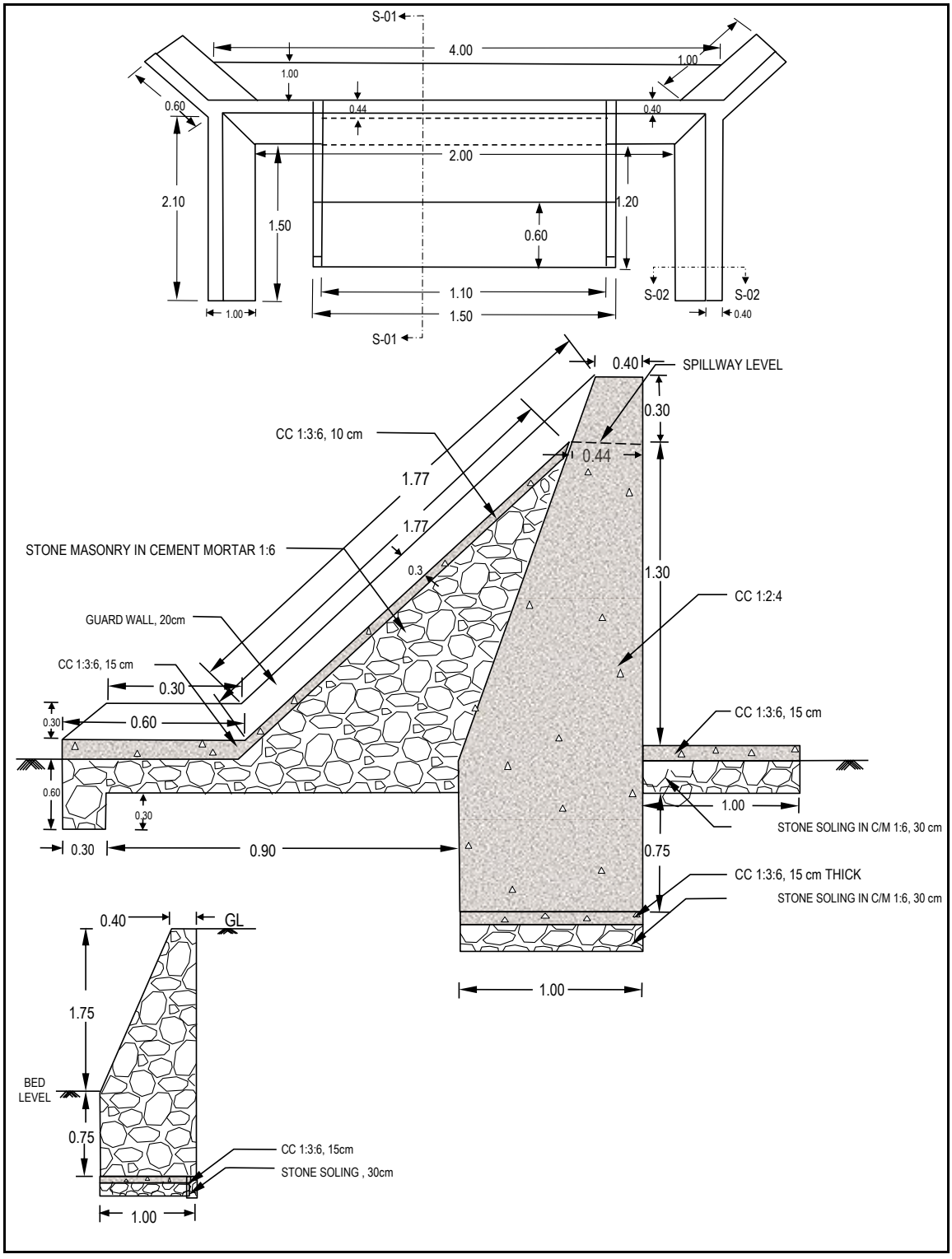
Elevation



Section

Model estimate for construction of Conservation Pond with core wall (which can be also used for fishery)													
Estimation under as per PWD SoR (other than National Highway Works) for Roads, 2020 - 2021													
(The below estimate is done in MS Excel, hence, decimals not shown is accounted in the calculation)													
	Size												
. No. / Item N	Particle	L		B		H				Quantity	Unit	Rate	Amount
1/3.20(a)	(a) Earthwork in excavation for foundations of structures as per drawings and Technical Specification Clause 307 including setting out construction of shoring and bracing deleterious matter, dressings of sides and bottom and backfilling with approved material (by manual means).												
	CC Core wall	12	x	0.3	x	0.45			=	1.62	cum		
	Spillway/Drain	12	x	0.6	+	1		0.6	=	5.76	cum		
					2					7.38	cum	₹463.00	₹3,416.94
2/3.4	Construction of embankment with material obtained from borrow pits with a lift upto 1.50 m , transporting to site, spreading, grading to required slope and compacting to meet requirement of Tables 300.1 and 300.2 with a lead upto 1000 m as per												
	Main Drain	12		2.25	+	8.5		2.5	=	161.25	cum		
					2								
	Deduct core wall	12		0.2	+	0.3		2.2	=	-6.60	cum		
					2					154.65	cum	₹768.00	₹118,771.20
3/3.20(b)	Providing and laying plain cement concrete M15 grade (1:2:4 hand mix)												
	Core Wall												
	Foundation	12	x	0.3	x	0.45			=	1.62	cum		
		12	x	0.2	+	0.3		2.2	=	6.6	cum		
					2								
	Spillway/Drain	12	x	1.5	x	0.1			=	1.8	cum		
										10.02	cum	₹10,082.00	₹101,021.64
4/14.5	Providing and laying pitching on slopes laid over prepared filter media as per drawing and Technical Specifications Clause												
	u/s	14.4		2.3		0.2				6.58368	cum		
										6.58368	cum	₹2,413.00	₹15,886.42

5/3.12	Furnishing and laying of the live sods of perennial turf forming grass on embankment slope, verges or other locations shown on the drawing or as directed by the Engineer including preparation of ground, fetching of sods and watering as per												
	Core wall												
	D/s	12		4.1						49.2	Sqm		
										49.2	Sqm	₹292.00	₹14,366.40
6/3.20 (d)	(d) Plastering with cement mortar 1:4												
	Spillway/ Drain	12		1.4						16.8	Sqm		
										16.8	Sqm	₹546.00	₹9,172.80
												Total	₹262,635.40
											10% Deduction		₹26,263.54
													₹236,371.86
												Board	₹6,000.00
												Grand total	₹242,371.86
												Say	**₹242,372.00**


S-01
4.00
1.00
1.00
0.60
0.44
0.40
2.00
2.10
1.50
1.20
0.60
1.10
1.50
S-02
S-02
1.00
0.40
S-01
0.40
SPILLWAY LEVEL
0.30
CC 1:3:6, 10 cm
0.44
1.77
1.77
STONE MASONRY IN CEMENT MORTAR 1:6
0.3
1.30
CC 1:2:4
GUARD WALL, 20cm
CC 1:3:6, 15 cm
0.30
0.60
0.30
CC 1:3:6, 15 cm
0.60
0.30
1.00
STONE SOLING IN C/M 1:6, 30 cm
0.30
0.90
0.75
CC 1:3:6, 15 cm THICK
STONE SOLING IN C/M 1:6, 30 cm
1.00
0.40
GL
1.75
BED
LEVEL
0.75
CC 1:3:6, 15cm
STONE SOLING , 30cm
1.00

Minor Irrigation Cement Concrete Dam																		
Estimation under as per PWD SoR (other than National Highway Works) for Roads, 2020 - 2021																		
(The below estimate is done in MS Excel, hence, decimals not shown is accounted in the calculation)																		
Sl. No. / Item No.	Particulars																	Amount
1/19.23	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 in above ground level and removal of rubbish up to a distance of 50 in outside the periphery of the area cleared.																	
			5	x	5								=	25				
													@	8	/m2			₹200.00
2/11.1																		
(I)	Earthwork in excavation for structures by manual means and disposal upto a lead of 50 m, etc																	
	Dam:		2	x	1	x	1.5						=	3	m3			
	Apron:		1.5	x	1.2	x	0.3						=	0.54	m3			
			1.5	x	0.3	x	0.3						=	0.135	m3			
			2	+	4													
				2		x	1	x	0.3				=	0.9	m3			
					1.5	+	2.10											
	W/Walls:		2	x		2		x	1	x	1.2		=	4.32	m3			
					0.6	+	1											
			2	x		2		x	1	x	1.2		=	1.92	m3			
														10.82	m3			
													@	505	/m3			₹5,461.58
3/11.6	Providing stone in foundation 1:6																	
I (iv)	Dam:	1	2	x	1	x	0.3						=	0.6	m3			
	Apron:	1	1.5	x	1.2	x	0.3						=	0.54	m3			
		1	1.5	x	0.3	x	0.3						=	0.135	m3			
			2	+	4													
		1		2		x	1	x	0.3				=	0.9	m3			
		1	0.5	x	1.5	x	1.77	x	0.73				=	0.97	m3			
					1.5	+	2.10											
	W/Walls:	1	2	x		2		x	1	x	0.3		=	1.08	m3			
					0.6	+	1											
		1	2	x		2		x	1	x	0.3		=	0.48	m3			
														4.70	m3			
													@	7,077.00	/m3			₹33,290.74
4/5.1	Providing cement concrete work in prop. 1:3:6 in foundation.																	
b	Weir:		2	x	1	x	0.15						=	0.30	m3			

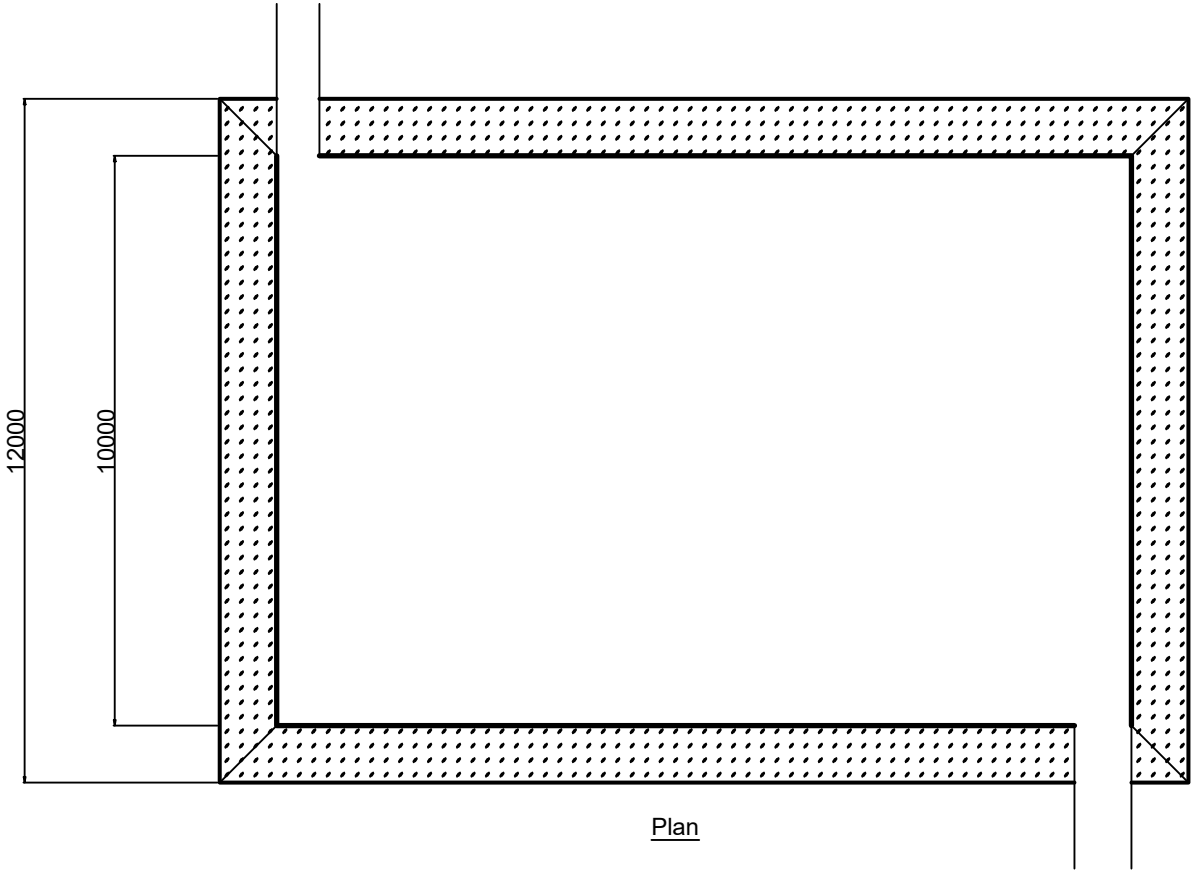
	Apron:		1.5	x	0.6	x	0.15					=	0.14	m3	
			1.5	x	1.77	x	0.1					=	0.27	m3	
			2	+	4							=			
				2		x	1	x	0.15			=	0.45	m3	
					1.5	+	2.10					=			
	W/Walls:		2	x		2		x	1	x	0.15	=	0.54	m3	
					0.6	+	1					=			
			2	x		2		x	1	x	0.15	=	0.24	m3	
													1.93	m3	
												@	9,658.00	/m3	₹18,644.77
5/5.1	Providing RCC grade M 15 corresponding to 1:2:4 proportion in sub-structure.														
c	Dam:		2	x	1	x	1.05					=	2.1	m3	
												@	10,997.00	/m3	₹23,093.70
6/5.2	Providing RCC grade M 15 corresponding to 1:2:4 proportion in super-structure.														
b					1	+	0.4					=			
	Dam:		2	x		2		x	1.75			=	2.45	m3	
					1.77	+	1.77					=			
	G/Walls:		2	x		2		x	0.3	x	0.2	=	0.2124	m3	
					0.3	+	0.6					=			
			2	x		2		x	0.3	x	0.2	=	0.054	m3	
													2.72	m3	
	Spillway Deduction:														
					0.44	+	0.4					=			
			1.1	x		2		x	0.3			=	-0.1386	m3	
											Volume left	=	2.58	m3	
												@	13,732.00	/m3	₹35,398.35
7/15.10	Plastering with cement mortar 1:3, 15 mm thick.														
			2	+	4							=			
	Dam:			2		x	1.6					=	4.8	m2	
					1.1	x	0.44					=	0.484	m2	
					3.8	x	0.4					=	1.52	m2	
			2	+	4	x	0.3		0.092			=			
				2									0.9	m2	
			0.4	+	0.44	x	0.3	x	2			=			
				2									0.252	m2	
	Apron:				1.1	x	1.77					=	1.947	m2	
					1.1	x	0.6					=	0.66	m2	

			2	+	4							=				
				2		x	1					=	3	m2		
					1.77	+	1.77					=				
	G/Walls:		4	x		2		x	0.4			=	2.832	m2		
					1.77	+	1.77					=				
			2	x		2		x	0.2			=	0.708	m2		
					0.3	+	0.6					=				
			4	x		2		x	0.45			=	0.81	m2		
					0.3	+	0.6					=				
			2	x		2		x	0.2			=	0.18	m2		
					1.5	x	0.15					=	0.225	m2		
													18.32	m2		
	Spillway Deduction:				1.1	x	0.3					=	0.33	m2		
					1.1	x	0.3					=	0.33	m2		
											Total Deduction	=	0.66	m2		
											Area left	=	17.66	m2		
												@	595	/m2		₹10,507.70
8/8.5	Construction of wing walls with stone masonry in cement mortar 1:6.															
					2.1	+	1.5					=				
			2	x		2		x	1	x	0.75	=	2.7	m3		
			2.1	+	1.5		1	+	0.4			=				
	2	x		2		x		2		x	1.75	=	4.41	m3		
					1	+	0.6					=				
			2	x		2		x	1	x	0.75	=	1.2	m3		
			1	+	0.6		1	+	0.4			=				
	2	x		2		x		2		x	1.75	=	1.96	m3		
													10.27	m3		
												@	7,001.00	/m3		₹71,900.27

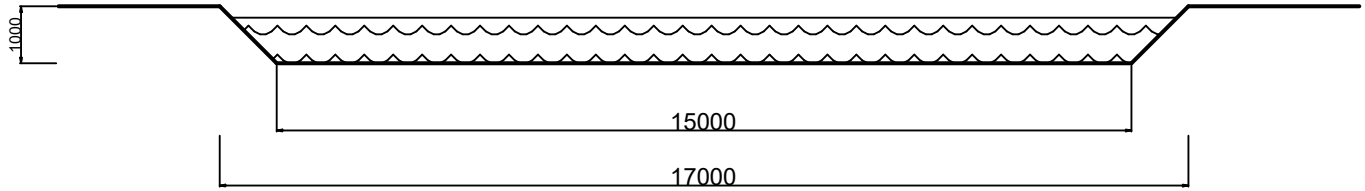
Item No.	Particular	Qnty	Sand	Stone	Cement	
3/11.4	C.C. 1:3:6	2.90	1.93	1.74	0.19	
4/12.5 & 5/13.1	C.C. 1:2:4	7.02	2.00	4.01	1.00	
2/11.6 & 7/8.4	Stone	14.97		14.97		
6/13.19	Plastering 1:3	0.40	0.30		0.10	
	TOTAL =		4.23	22.01	1.29	
9/1.10	Haulage excluding Loading and Unloading.					
	(A) Stone / Aggregate					
	Case II: Unsurfaced Road/ Kutcha Road @ Rs. 11.00 / t.km					

	vide item 8/1.1 (i)					=	39.62						
		Per Km.		11	x	12				@	132	/ton	₹5,230.00
	(B) Sand												
	Case II: Unsurfaced Road/ Kutcha Road @ Rs. 10.00 / t.km												
	vide item 8/1.1 (ii)					=	6.14						
		Per Km.		10	x	12				@	120	/ton	₹736.59
	(C) Cement												
	Case II: Unsurfaced Road/ Kutcha Road @ Rs. 9.00 / t.km												
	vide item 8/1.4 (i)					=	2						
		Per Km.		9	x	12				@	108	/ton	₹201.36
												Total	₹204,465.05
											Deducting 10 % contractor's profit		₹20,446.51
												Net Total	₹184,018.55
												Board	₹6,000.00
												Grand Total	**₹190,018.55**

Construction of Conservation Ponds
(which can be also used for fishery)
In to in = (10 x 15)m



Plan

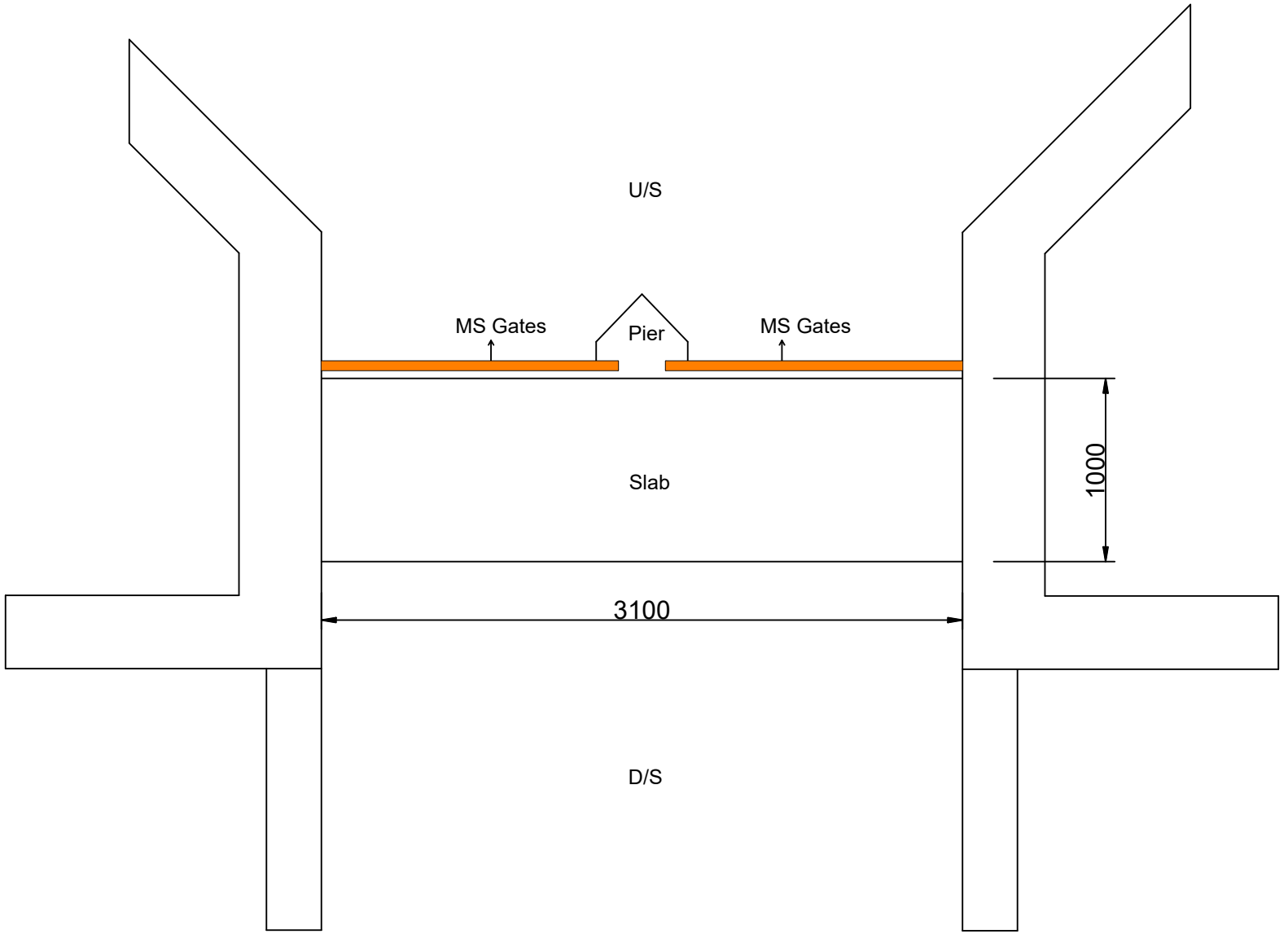


Side View

Water Harvesting Structure (Dugout Pond) No. 1																		
Estimation under as per PWD SoR (other than National Highway Works) for Roads, 2020 - 2021																		
(The below estimate is done in MS Excel, hence, decimals not shown is accounted in the calculation)																		
Sl. No. / Item No	Particulars																	Amount
1/19.23	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 in above ground level and ren																	
		1	x	1	x	19	x	14	x	-		266	sqm					
												266	sqm	₹8.00	=	Rs		₹2,128.00
2/11.1(i)																		
	Earthwork in excavation to the proper grade including light dressing, etc and removal of spoil upto 30m lead and all lift.																	
	(a) Ordinary soil																	
	(	17	x	15	) + (	12	x	10	)									
					2					x	1	187.5	m3					
												187.5	m2	₹505.00	=	Rs		₹94,687.50
3/3.19	Cutting side drain as outlet cum canal of average cross sectional area 0.40 sqm.																	
A																		
					Length =	8	m											
											@		m	₹103.00	=	Rs		₹824.00
4/3.12	Furnishing and laying of the live sods of perennial turf forming grass on embankment slope, verges or other locations shown on the drawing or as directed by the Enginee																	
	D/s					30.85				0.75		23.1375	Sqm					
												23.1375	Sqm	₹292.00	=	Rs		₹6,756.15
5/8.6	Providing boulder or stone filling with boulders or stones 15 cm size, 60 cm wide behind the rctaining wall etc. complete as directed.																	
						8		0.2		0.2		0.32	Cum					
						30.85		0.2		0.2		1.234	Cum					
												1.554	Cum	₹2,381.00	=	Rs		₹3,700.07
														Total	=	Rs		₹108,095.72
														Deduction 10% contractor profit	=	Rs		₹10,809.57
																		₹97,286.15
														Board	=	Rs		₹6,000.00
														Grand Total	**=**	**Rs**		**₹103,286.15**

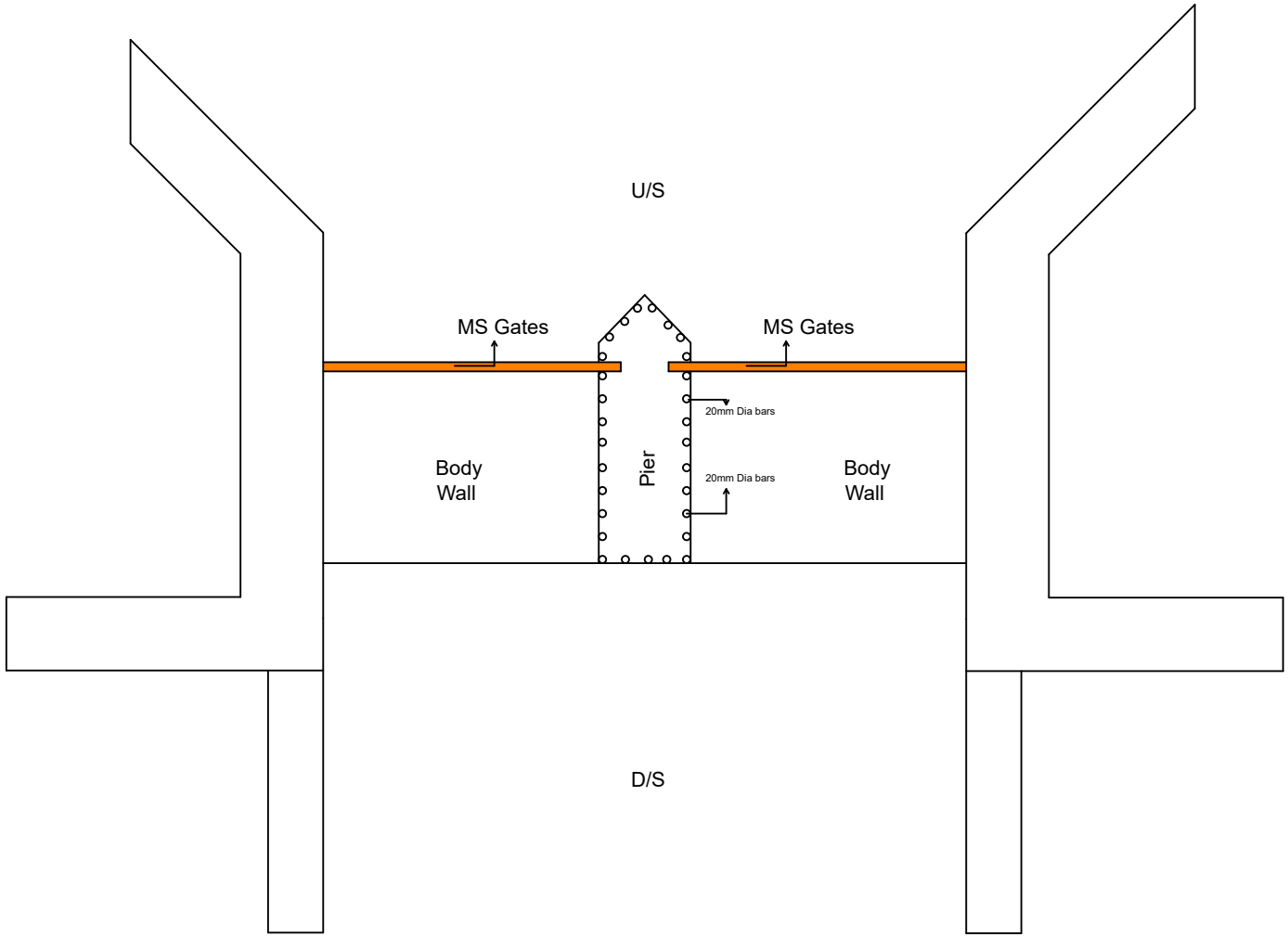
VENTED CHECK DAM

CONSIDERING A RIVER WIDTH = 3.1M & HFL = 2M



VENTED CHECK DAM

CONSIDERING A RIVER WIDTH = 3.1M & HFL = 2M



Vented Dam															
Estimation under as per PWD SoR (other than National Highway Works) for Roads, 2020 - 2021															
(The below estimate is done in MS Excel, hence, decimals not shown is accounted in the calculation)															
		Nos	L	B	H										
	Above Abutment	2	1.5	0.45	1.2				River Width	=	3.10	m			
	Below Abutment	2	1.5	0.3	1.2				HFL	=	1.50	m			
	Return wall	4	1.5	0.45	1.2										
	Body wall	1	3.5	1.5	0.3										
	Pier	1	1.2	0.5	1.2										
	Site Clearance														
1/19.23 (PWD, B SOR)	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 in above ground level and removal of rubbish up to a distance of 50 in outside the periphery of the area cleared.														
		2		x	10	x	10	x		=	200.00				
											@	8	/m2		₹1,600.00
	Excavation														
2/11.1 (SOR Roads)	Earthwork in excavation for structures by manual means and disposal upto a lead of 50 m, etc														
(I)	Abutment	2		x	1.5	x	0.45	x	1.2	=	1.62				
	Return wall	4		x	1.5	x	0.45	x	1.2	=	3.24				
	Body wall	1		x	3.5	x	1.5	x	0.3	=	1.58				
	U/S Cutoff	1		x	6.1	x	0.45	x	0.9	=	2.47				
	D/s Cutoff	1		x	6.1	x	0.45	x	1.3	=	3.57				
	Retaining Wall	2		x	1.5	x	0.9	x	0.75	=	2.03				
										=	14.50				
											@	505	/m3		₹7,322.00
	Soling														
3/11.6	Providing stone in foundation 1:6														

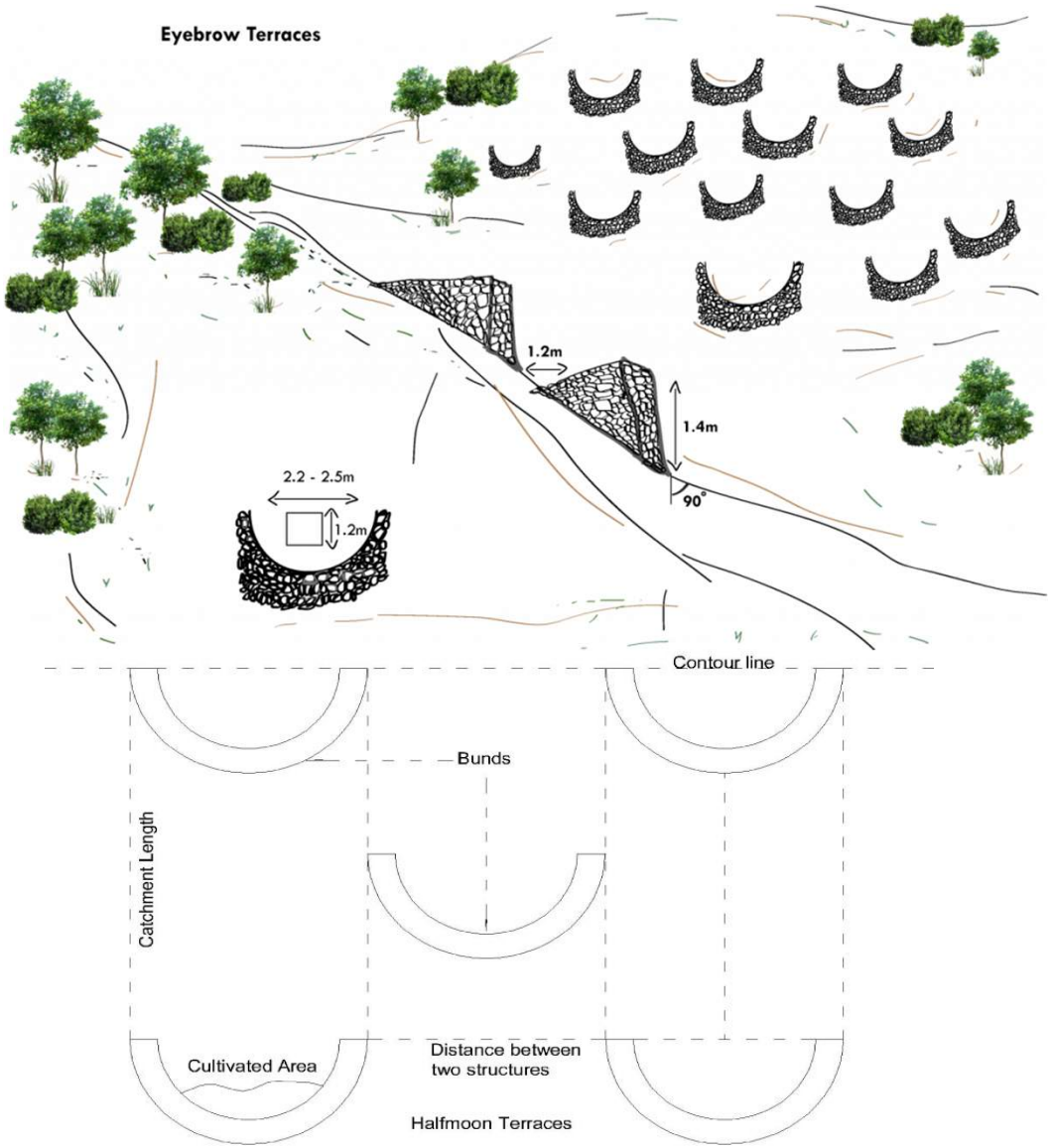
I (iv)	Stone Soling 300mm													
	Abutment	2		x	1.5	x	0.45	x	0.3	=	0.41			
	Return wall	4		x	1.5	x	0.45	x	0.3	=	0.81			
	Body wall	1		x	3.5	x	1.5	x	0.3	=	1.58			
	Retaining Wall	2		x	1.5	x	0.9	x	0.3	=	0.81			
	Footing	1		x	1.2	x	3.1	x	0.3	=	1.12			
	U/s Cutoff	1		x	6.1	x	0.45	x	0.3	=	0.82			
	D/s Cutoff	1		x	6.1	x	0.45	x	0.3	=	0.82			
											6.36			
											@	7077	/m3	₹45,030.95
	PCC													
4/5.1	Providing cement concrete work in prop. 1:3:6 in foundation.													
b	1 :3:6 (1 Cement: 3 coarse sand: 6 graded stone aggregate 20mm													
	Abutment	2		x	1.5	x	0.45	x	0.15	=	0.20			
	Return wall	4		x	1.5	x	0.45	x	0.15	=	0.41			
	Body wall	1		x	3.5	x	1.5	x	0.15	=	0.79			
	Retaining Wall	2		x	1.5	x	0.9	x	0.15	=	0.41			
	Footing	1		x	1.2	x	3.1	x	0.15	=	0.56			
	U/s Cutoff	1		x	6.1	x	0.45	x	0.15	=	0.41			
	D/s Cutoff	1		x	6.1	x	0.45	x	0.15	=	0.41			
											3.18			
											@	9658	/m3	₹30,726.93
5/8.5	Construction of wing walls with stone masonry in cement mortar 1:6.													
	Return Wall	4		x	1.5	x	0.45	x	1.2	=	3.24			
	Retaining Wall	2		x	1.5	x	0.45	x	1.2	=	1.62			
	U/s Cutoff wall	1		x	6.1	x	0.45	x	0.9	=	2.47			
	D/s Cutoff Wall	1		x	6.1	x	0.45	x	1.3	=	3.57			
	Body wall	1		x	3.5	x	1.5	x	0.3	=	1.58			

											12.47			
											@	7001	/m3	₹87,330.47
	Re Bars													
6/13.3	Supplying fitting and placing TMT bar reinforcement (Fe 415) in superstructure complete as per draw													
		Nos			L		No of bars		Unit weight					
		10mm Dia Bar												
	Footing													
	Jali	2		x	1.2	x	21	x	0.62	=	30.75			
	Jali	2		x	3.1	x	8	x	0.62	=	30.75			
	Abutment													
	Vertical	2		x	1.2	x	10	x	0.62	=	14.88			
	Horizontal	2		x	1.5	x	8	x	0.62	=	14.88			
	Slab	1		x	4	x	7.5	x	0.62	=	18.60			
		1		x	0.9	x	40	x	0.62	=	22.32			
		20mm Dia Bar												
	Pier	1		x	2.1	x	23	x	2.47	=	117.57			
	Stirrups	1		x	3.4	x	18	x	0.395	=	23.50			
											273.26	Kg		
											0.30	tonne		
											@	100489	/tonne	₹30,268.38
	RCC													
7/13.1	Providing and laying reinforced cement concrete in superstructure as per drawing and Technical Specification Clauses 800, 1205.4 and 1205.5.													
	(ii) Nominal Mix 1 : 2 : 4 (Hand Mix), 1. Height upto 5m													
	Footing	1		x	1.2	x	3.1	x	0.3	=	1.12			
		1		x	0.95	x	1.65	x	0.2	=	0.31			
	Abutment	2		x	1.5	x	0.45	x	0.1	=	0.14			
	Pier	1		x	1.5	x	0.5	x	0.1	=	0.08			

											1.64			
											@	13732	/m3	₹22,513.61
8/17 PHE	Providing and laying c.c work in proportion 1:1 11/2:3corresponding M15 with hard stone or river shing													
	M20 or 1 :11/2:3 (1 cement: 11/2 coarse sand: 3 graded stone aggregate 20 mm nominal size)													
	Abutment walls	2		x	1.5	x	0.45	x	2	=	2.70			
	Pier	1		x	1.2	x	0.5	x	1.2	=	0.72			
	Pier	1		x	0.15	x	0.5	x	1.2	=	0.09			
	Pier	1		x	0.35	x	0.35	x	0.8	=	0.10			
	Slab	1		x	3.5	x	0.9	x	0.125	=	0.39			
										=	4.00			
											@	13732	/m3	₹54,952.03
8	Shutters													
36 PHE	Providing fitting fixing in position steel gates with RSJ posts (100r													
	Shutters	2		x	1.3	x		x	1.2	=	3.12			
											@	4736	/m2	₹14,776.32
	Handrail													
11.17	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, Vc fixing the railing with necessary													
		Nos	L	No of bars	Unit weight									
	Frame	MS Round (Size 10mm dia)												
	Horizontal	2		x	2	x		x		=	4.00			
										=	4.00	Rm		
												5801	/Rm	₹23,204.00
16.19	Painting with synthetic enamel paint of approved brand and manu													
	New work (two or more coats)													
	Hand Rail (Horizor	2		x	2	x		x	0.03	=	0.12			

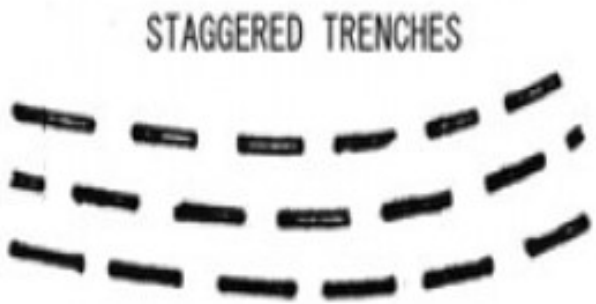
										=	0.12			
											@	103	/m2	₹12.36
Item No.	Particular	Qnty			Cement		Sand		Stone					
1	C.C. 1:3:6	3.18			0.32		2.12		1.91					
2	C.C. 1:1.5:3	4.00			0.73		1.09		2.18					
3	cement mortar 1:6.	12.47			1.78				10.69					
4	Stone	12.47							12.47					
TOTAL =					2.83		3.21		27.26					
14/1.1	Carriage for Sand													
						=	3.21							
	Per Km.	11	x	20						@	220	/cum		₹706.73
15/1.3	Carriage for Aggregate													
						=	27.26							
	Per Km.	12	x	20						@	240	/cum		₹6,541.84
16/1.5	Carriage for Cement													
						=	2.83							
	Per Km.	10	x	20						@	200	/ton		₹565.55
16/1.5	Carriage for Steel													
						=	0.30							
	Per Km.	10	x	20						@	200	/ton		₹60.24
													Total=	₹325,611.41
												Deducting 10 % contractor's profit		₹32,561.14
														₹293,050.27
													Board	₹6,000.00
														₹299,050.27
													Say =	**₹300,000.00**

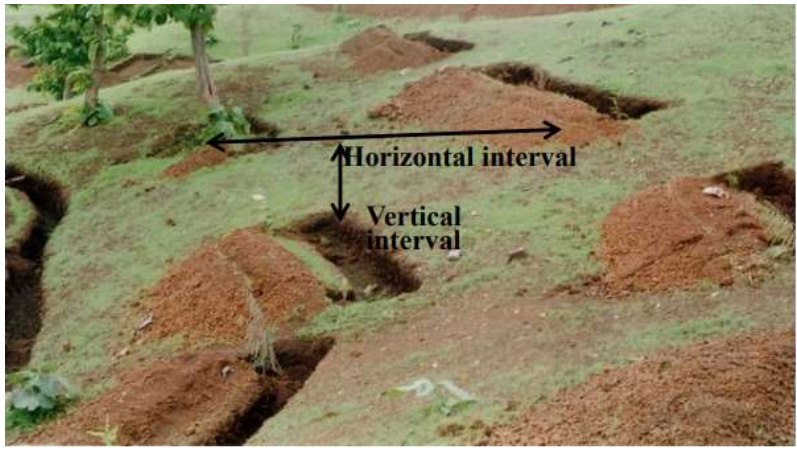
Annexure-4

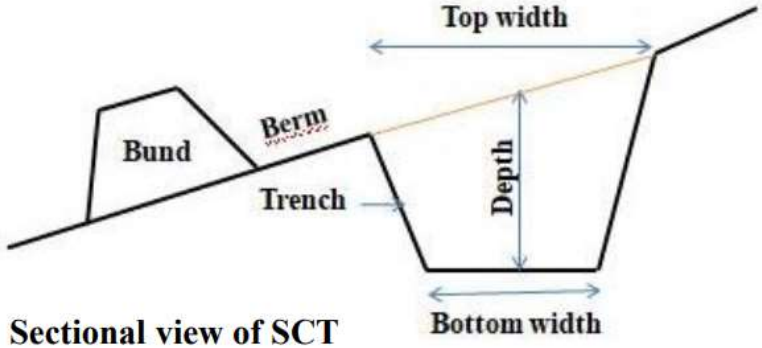


Gradient %	Stone ring diameter	Inner cross width	Backwall height	Reinforced backwall
30	30 cm	220 cm	70 cm	–
45	30 cm	180 cm	120 cm	10 cm
60	30 cm	140 cm	180 cm	20 cm

Gradient %	Distance between lines of eyebrow terraces (m)
30	15-20
45	10-15
60	8-10







Sectional view of SCT

Estimation of Staggered Contour Trenches (10ha)

S.No.	Particulars	Quantity (Model 3)	Unit	Unit Rate	Total Cost (Model 3) (INR)
1	Qt = Stored (%) * C * R(mm)* A (ha)/10	8400	cum		
2	1/1000 10000m				
3	Volume of contour trench including free board V(cum) = Length(m) * Average width (m) * Depth (m) Length = 2.25m, TW= 0.60m, BW=0.40m, Depth =0.5m	0.5625	cum		
4	Pit to Pit distance	13.5	m		
5	No of Contour trenches required for 10 ha Q/(V*f) trench will fill 2 times	823			
6	Assuming 3 filling, so water available for trench filling	2800	cum		
7	Volume of trenches work in 10 ha Length of SCT x Sectional area	463	cum		
8	Excavation rate /unit on the basis of SOR (3.5) (i) - Contractor's profit		INR/cum	163.2	
9	Earthwork in excavation in cutting in soil by manual means		INR		75556
10	Per ha cost		INR		7556
11	Per trench cost		INR		91.80

Estimation for Half-moon Terraces (10ha)

S.No.	Particulars	Quantity (Model 3)	Unit	Unit Rate	Total Cost (Model 3) (INR)
1	Volume of Half moon terrace bund V(cum) = 22/7*radius(m) * Average width (m) * Depth (m) Length = 2.50 m, TW= 0.40m, BW=0.60m, Depth =0.5m	0.491071	cum		
2	Terrace to Terrace distance	15	m		
3	No of half moon terraces required for 10 ha Q/(V*f)	667	Nos.		
4	Volume of trenches work in 10 ha Length of Half moon terrace x Sectional area	327	cum		
5	Loading and unloading rate /unit on the basis of SOR (1.1) (i&iii) - contractor's profit of 10%		INR/cum	140.40	
6	Construction of half moon terraces by manual means		INR		45964
7	Per ha cost		INR		4596
8	Per terrace cost		INR		68.95